

Appl. No. 10/780,714
Amendment dated: July 1, 2006
Reply to OA of: March 2, 2006

REMARKS

Applicants note the comments in the Official Action that the newly added claims are product by process claims. However, there is nothing to support the statement that product by process claims cannot be linking claims. In view of the present amendment which is believed to place the application in condition for allowance, claims 13 and 14 should be examined with the elected invention. Accordingly, it is most respectfully requested that the restriction be withdrawn.

Applicants have carefully reviewed the Examiner's Office Action dated March 2, 2006, in which the Examiner rejected claims 1-5 and 8-14 under 35 U.S.C. 112, second paragraph, under 35 U.S.C. 102(b) or under 35 U.S.C. 103(a). These rejections have been carefully considered but are most respectfully traversed in view of the amendments to the claims and the following comments.

Claim 2 has been amended to add the limitations of claim 4 and to more particularly define the present invention without adding any new matter. All of the amendments to the claims are fully supported by the application as originally filed and as would be appreciated by one of ordinary skill in the art to which the invention pertains. Claim 4 has been canceled without prejudice or disclaimer. Claim 5 has been rewritten in independent form. Claims 11 and 12 have been amended to remedy informalities noted by the Examiner whose helpful suggestions are very much appreciated. Claims 15-19 corresponding to claims 3, 9, 10, 12 and 14 have been newly entered. Applicants most respectfully submit that all of the claims now present in the application are in full compliance with 35 USC 112 and are clearly patentable over the references of record. The rejection of the claims under 35 USC 112 should be withdrawn in view of the amendments to the claims. The rejection of claims 1 and 2 as being indefinite under 35 USC 112, second paragraph, for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention is carefully considered but most respectfully traversed. The Examiner stated that the language of "size" renders the claims 1 and 2 indefinite. However, since the shape of the structure is not defined in the claims 1 and 2, and since the structure

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may actually have various shapes, e.g., sphere, hemisphere, ellipse, half ellipse, or the like(see the description, page 11 lines 9-11), it is impossible to replace "size" with "thickness" or "diameter" as would be appreciated by one of ordinary skill in the art. Further, the claim language is clear to one of ordinary skill in the art. Accordingly, it is respectfully requested that the 112 rejection should be withdrawn.

The rejection to claims 1-4, 8, 9 and 10 under 35 USC 102(b) as being anticipated by Xu et al (US 5,872,422) is carefully considered but most respectfully traversed. Applicants wish to direct the Examiner's attention to MPEP §2131 which states that to anticipate a claim, the reference must teach every element of the claim.

"A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference." *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). "The identical invention must be shown in as complete detail as is contained in the claim." *Richardson v. Suzuki Motor Co.*, 868 F.2d 1226, 1236, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989). The elements must be arranged as required by the claim, but this is not an *ipsissimis verbis* test, i.e., identity of terminology is not required. *In re Bond*, 910 F.2d 831, 15 USPQ2d 1566 (Fed. Cir. 1990).

With regard to claim 1

The present invention as defined in claim 1 relates to a carbon substance used in an electron emission element. The carbon substance includes a structure including carbon and a metal or a metallic oxide, and a plurality of line-shaped bodies. Further, the line-shaped bodies include carbon and grow radially from a surface of the surface. The carbon substance is advantages over the prior art as follows:

1) In case the carbon substance is sprinkled on a surface of a substrate, whatever direction the base structure is arranged in, a large number of protrusions are directed along a direction perpendicular to the substrate (i.e., a direction in which electrodes for emission are arranged), so that an electric field can be easily applied to the line-shaped bodies (an electric field can be easily concentrated).

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2) When the carbon substance is mixed with a matrix material, the line-shaped body works as an anchor which makes it difficult to come out of the matrix.

3) The carbon substance may be used in various fields, such as an electrode for primary cell, an electrode or a mixing material in an electrode for secondary cell, a catalyst carrier for fuel cell, and the like.

In contrast, Xu et al. (U.S. 5,872,422), relied upon in the rejection, discloses an electron field emission device. As shown in Fig. 1, the device includes a substrate 12, a patterned metal catalyst film 14 on the substrate 12 and carbon fiber emitters 20 formed onto the catalyst metal film 14. However, the pattern metal catalyst film 14 is deposited on the substrate 12 with a plane-shape. Further, the carbon fiber emitters 20 grows vertically from the patterned metal catalyst film 14. Accordingly, Xu et al. does not disclose that the line-shaped bodies grow radially from the surface of the structure in accordance with the presently claimed invention.

It is also believed that claim 8, directly depending on one of claim 1, is allowable for the same reasons indicated with respect to claim 1 and further because of the additional features recited therein which, when taken alone and/or in combination with the features recited in claim 1 remove the invention defined therein further from the disclosures made in the prior art reference.

With regard to claim 2

In claim 2 of the present invention, a carbon substance includes structures and line-shaped bodies. Further, at least parts of the line-shaped bodies connect two or more separate structures.

In Xu et al., however, the pattern metal catalyst film 14 is not formed except on the substrate 12. Further, the carbon fiber emitters 20 grow in parallel with each other on the pattern metal catalyst film 14. Accordingly, the carbon fiber emitters 20 cannot connect two or more pattern metal catalyst films, structurally.

It is also believed that claims 3, 9 and 10, directly or indirectly depending on one of claim 2, are allowable for the same reasons indicated with respect to claim 2 and further because of the additional features recited therein which, when taken alone

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and/or in combination with the features recited in claim 2 remove the invention defined therein further from the disclosures made in the prior art reference.

The rejection to claim 5 under 35 USC 103(a) as being unpatentable by Xu as applied to claim 1 and further in view of Nettleton (US 2003/0082092) is carefully considered but most respectfully traversed.

The present invention as defined in claim 5 is directed to a carbon substance including one or more structures and one or more line-shaped bodies. Further, the line-shaped bodies grow from surfaces of the structures, and include at least one body starting from and returning to a same structure.

Nettleton discloses a carbon nanoloop. However, Nettleton does not disclose a line-shaped body starting from and returning to a same structure. In Nettleton, the nanoloop is not attached to any other elements. Accordingly, the present invention as defined in claim 5 is patentable over Xu et al. in view of Nettleton.

The rejection to claims 11 and 12 under 35 USC 103(a) as being unpatentable by Xu as applied to claims 1 and 2 and further in view of Smalley et al (US 2002/0127162) is carefully considered but most respectfully traversed.

The rejection to claims 13 and 14 under 35 USC 103(a) as being unpatentable by Xu as applied to claims 1 and 2 and further in view of Muroyama et al (US 6,991,949) is carefully considered but most respectfully traversed.

Smalley and Muroyama do not disclose the carbon substance of the present invention. Accordingly, the combinations of Xu et al., and Smalley or Muroyama do not teach or suggest the subject matters of the present invention. Therefore, it is also believed that claims 11-14 are patentable over the cited references.

Applicants believe that this is a full and complete response to the Office Action. For the reasons discussed above, applicants now respectfully submit that all of the pending claims are in complete condition for allowance. Accordingly, it is respectfully requested that the Examiner's rejections be withdrawn; and that claims 1-3, 5 and 8-19 be allowed in their present form.


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Should the Examiner require or consider it advisable that the specification, claims an/or drawings be further amended or corrected in formal respects, in order to place the case in condition for final allowance, then it is respectfully requested that such amendment or correction be carried out by Examiner's Amendment and the case be passed to issue.

Alternatively, should the Examiner feel that a personal discussion might be helpful in advancing this case to allowance, the Examiner is invited to telephone the undersigned.

Respectfully submitted,

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